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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/027,784	12/19/2001	Paul V. Long	20030/87:1	9581

3528 7590 08/29/2003

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EXAMINER	
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ART UNIT	PAPER NUMBER
2851	

DATE MAILED: 08/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/027,784	Applicant(s) LONG ET AL.	
	Examiner Michelle Nguyen	Art Unit 2851	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 June 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-5,8-10 and 12-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-5,8-10 and 12-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 December 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Arguments

1. Examiner notes the cancellation of claim 11.

2. Applicant's arguments with respect to claims 1, 3-5, 8-10, 12-23 have been considered but are moot in view of the new ground(s) of rejection set forth below.

3. As to new claims 24-27, U.S. Patent No. 6,371,617 to Nishida et al., U.S. Patent No. 6,318,863 to Tiao et al. and U.S. Patent No. 5,704,701 to Kavanagh et al. have been applied to the rejection of the claims made under 35 U.S.C. 103, and set forth below.

Claim Objections

4. Claims 14, 21, 22, 24 and 26 are objected to because of the following informalities:

(a) Claim 14 recites the limitation "the light-absorbing surface" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

(b) In claim 21, line 4, "read" should be --red--.

(c) In claim 21, line 5, "diachronic" should be --dichroic--.

(d) In claim 22, line 1, "directly" should be --directing--.

(e) In claim 24, line 4, "one the" should be --one of the--.

(f) In claim 24, line 12, "surface" should be --surfaces--.

(g) In claim 26, lines 6 and 10, "diachronic" should be --dichroic--.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 4, 5, 10, 13, 18, 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,262,851 to Marshall in view of U.S. Patent No. 6,129,437 to Koga et al. and U.S. Patent 6,318,863 to Tiao et al.

With regard to claim 1, Marshall discloses a prior art image projection system, comprising:

a projection lens (projection lens 460) (see Fig. 4);

a dichroic cross-combiner assembly (dichroic prism 450) having outer surfaces with one outer surface facing the projection lens (see Fig. 4);

three display devices (SLMs 435, 440, 445), each positioned facing an outer surface of the dichroic cross-combiner assembly (see Fig. 4); and

a light source apparatus (light sources 405, 410, 415) to generate blue, green, and red light, with the light source apparatus being positioned such that the generated blue, green, and red light are provided to the three display devices respectively, without passing through the dichroic cross-combiner assembly, and the three micromirror display devices in turn reflecting the blue, green, and red light through the dichroic cross-

combiner assembly toward the projection lens (see Col. 3, lines 7-21, Fig. 4).

The prior art image projection system is not shown comprising three micromirror display devices. Instead, the prior art image projection system is shown comprising three liquid crystal display devices (see Col. 1, lines 21-5, Fig. 4). However, Koga et al. teach that well known advantages of employing a micromirror display device comprising an array of digitally deflected mirrors over a liquid crystal display device include better utilization of light, heat resistance property, and high-speed response characteristics (see Col. 1, line 54 to Col. 2, line 10, Fig. 9). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to replace the liquid crystal display device of the prior art projection system discussed by Marshall with the micromirror display devices discussed by Koga et al. for improving overall display performance.

The prior art projection system also is not shown explicitly comprising a coherent light source apparatus. Instead, the prior art projection system is shown comprising merely three sources of light for generating red, green and blue light (see Col. 3, lines 1-5). However, Tiao et al. teach that advantages of employing a coherent light source apparatus include low power consumption, long lifetime and generation of low thermal energy (see Col. 1, lines 62-6). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to manufacture the light source apparatus of the prior art projection system discussed by Marshall such that it comprises the

coherent light source apparatus discussed by Tiao et al. for improving overall system performance.

With regard to claim 4, Tiao et al. teach the coherent light source apparatus discussed above with respect to claim 1 to include light emitting diodes (see Col. 3, lines 25-31).

With regard to claim 5, Tiao et al. teach the coherent light source apparatus discussed above with respect to claim 1 to include lasers (see Col. 3, lines 25-31).

With regard to claim 10, the light source apparatus of the prior art projection system discussed above with respect to claim 1 is shown positioned such that the three display devices respectively receive blue, green and red light at an oblique angle of incidence (see Fig. 4, esp. SLM 435).

With regard to claim 13, each display device of the prior art projection system discussed above with respect to claim 1 is shown including reflective pixels that are adapted to selectively reflect the respective blue, green and red light towards one of the projection lens or a light-absorbing surface in proximity to the projection lens (see Col. 1, lines 21-5, Fig. 4).

With regard to claim 18, the dichroic cross-combiner assembly of the prior art projection system discussed above with respect to claim 1 is shown being adapted to simultaneously receive the blue, green and red light from the respective display devices and to combine the blue, green and red light to form a composite image directed toward the projection lens (see Fig. 4).

With regard to method claims 21 and 22, the structure of the projection system discussed above with respect to claims 1, 10 and 18 renders the steps set forth in the method claims inherent to the operation of the projection system.

7. Claims 3 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall in view of Koga et al. and Tiao et al. as applied to claim 1 above, and further in view of U.S. Patent No. 5,159,485 to Nelson.

With regard to claim 3, Marshall does not show the prior art projection system discussed above with respect to claim 1 comprising three pairs of lenses. However, Nelson teaches adding to a projection system a pair of anamorphic lenses including an expanding lens (element 206) and a collimating lens (lens 104) for optimizing optical efficiency, the pair being positioned between a light source (light source 11) and a micromirror display device (DMD 40) (Col. 2, lines 37-43, Fig. 4). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to add to the prior art projection system discussed by Marshall three pairs of anamorphic lenses as disclosed by Nelson for optimizing optical efficiency.

With regard to method claim 23, the structure of the projection system discussed above with respect to claim 3 renders the steps set forth in the method claim inherent to the operation of the projection system.

8. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall in view of Koga et al. and Tiao et al. as applied to claim 1 above, and further in view of U.S. Patent No. 6,396,619 to Huibers et al.

With regard to claim 8, Koga et al. are silent as to the shape and axis of pivot of the digitally deflected mirrors discussed above with respect to claim 1. However, Huibers et al. teach a digitally deflected mirror (deflectable micro-mirror structure 700), which is quadrilateral and pivotable about a diagonal axis (see torsion hinge 734) (see Fig. 7A). It would have been obvious to one having ordinary skill in the art at the time the invention was made to fabricate the micromirror displays of Koga et al. such that they comprise the digitally deflected mirrors of Huibers et al. for providing means for modulating light.

With regard to claim 9, Koga et al. are silent as to the shape and axis of pivot of the digitally deflected mirrors discussed above with respect to claim 1. However, Huibers et al. teach a digitally deflected mirror, which is quadrilateral and pivotable about a longitudinally centered axis (see Figs. 6, 10). It would have been obvious to one having ordinary skill in the art at the time the invention was made to fabricate the micromirror displays of Koga et al. such that they comprise the digitally deflected mirrors of Huibers et al. for providing means for modulating light.

9. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall in view of Koga et al. and Tiao et al. as applied to claim 1, and further in view of U.S. Patent No. 5,704,701 to Kavanagh et al.

With regard to claim 12, the light source apparatus of the prior art projection system discussed above with respect to claim 1 is not shown positioned below the dichroic cross-combiner assembly. However, Kavanagh et al. teach folding a light path for obtaining compactness of a projection system, a

light source apparatus (lamp 1) being positioned below a prism (see face 19) (see Col. 6, lines 50-1, Fig. 5B). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the projection system of Nishida et al. such that the light path is folded as taught by Kavanagh et al. for obtaining a more compact projection system.

10. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall in view of Koga et al. and Tiao et al., and further in view of U.S. Patent No. 6,155,687 to Peterson.

With regard to claim 14, the prior art projection system discussed above with respect to claim 1 is not shown comprising a light-absorbing surface in proximity to the projection lens. However, Peterson teaches that it is well known in the art to add to a projection system a light-absorbing surface (light-absorbing surface 66) in proximity to a projection lens (projection lens 52), light-absorbing surface being positioned on a frame (optical frame 54) around the projection lens (see Col. 2, lines 33-8, 46-50, Fig. 2). It would have been obvious to one having ordinary skill in the art at the time the invention was made to add to the prior art projection system discussed by Marshall the well-known light-absorbing surface discussed by Peterson for preventing unwanted light from being projected by the projection lens, and thereby for improving display performance.

11. Claims 15-17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall in view of Koga et al. and Tiao et al., and further in view of U.S. Patent No. 5,658,060 to Dove.

With regard to claim 15, the dichroic cross-combiner assembly of the prior art projection system discussed above with respect to claim 1 is not shown including an X-cube. Instead, the dichroic cross-combiner assembly is shown including a three-prism assembly (see Fig. 4). However, Dove teaches the substitution of a cross prism, or an X-cube, for a three-prism assembly, thereby further teaching a cross prism and a three-prism assembly to be art-recognized equivalents (see Col. 3, lines 15-8). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute for the three-prism assembly of the prior art projection system discussed by Marshall the cross prism discussed by Dove for providing an alternative means for recombining rays of light.

With regard to claim 16, the sides of the dichroic cross-combiner assembly of the prior art projection system discussed above with respect to claim 1 are not shown being rectangular. Instead, the dichroic cross-combiner assembly is merely shown including a three-prism assembly (see Fig. 4). However, Dove teaches the substitution of a cross prism, or an X-cube having rectangular sides, for a three-prism assembly, thereby further teaching a cross prism and a three-prism assembly to be art-recognized equivalents (see Col. 3, lines 15-8, Fig. 3). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute for the three-prism assembly of the prior art projection system discussed by Marshall the cross prism discussed by Dove for providing an alternative means for recombining rays of light.

With regard to claim 17, the dichroic cross-combiner assembly of the prior art projection system discussed above with respect to claim 1 is not shown including two X-cubes. Instead, the dichroic cross-combiner assembly is shown including a three-prism assembly (see Fig. 4). However, Dove teaches the substitution of one or more cross prisms, or X-cubes, for a three-prism assembly, thereby further teaching cross prisms and three-prism assemblies to be art-recognized equivalents (see Col. 3, lines 15-8, Figs. 2-4). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute for the three-prism assembly of the prior art projection system discussed by Marshall two of the cross prisms discussed by Dove for providing an alternative means for recombining rays of light.

With regard to claim 19, the prior art projection system discussed above with respect to claim 1 is not shown further comprising three field lenses. However, Dove teaches adding to a projection system three field lenses (correcting lenses 72, 74, 76) for maximizing display performance, each field lens being positioned between one of three display devices (valves 40, 42, 44) and one of the outer surfaces of a dichroic cross-combiner assembly (color dichroic cube 64) (see Col. 3, lines 35-43, Fig. 5). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to add to the prior art projection system discussed by Marshall the field lenses of Dove for maximizing display performance.

12. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall in view of Koga et al. and Tiao et al., and further in view of U.S. Patent No. 5,760,875 to Daijogo et al.

With regard to claim 20, the width of the bands of blue, green and red light of the prior art projection system discussed above with respect to claim 1 is not specified. However, Daijogo et al. teaches a narrow band of green light having full-width half-maximum spectra of less than about 40 nanometers to render a satisfactory hue of the color green (see Col. 18, lines 2-6). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the light source apparatus of the prior art projection system discussed by Marshall such that the widths of the bands of color render satisfactory hues of blue, green and red as taught by Daijogo et al.

13. Claims 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,371,617 to Nishida et al. in view of U.S. Patent No. 6,318,863 to Tiao et al. and U.S. Patent No. 5,704,701 to Kavanagh et al.

With regard to claim 24, Nishida et al. disclose an image projection system, comprising:

a projection lens (projection lens 300) (see Fig. 10);

a dichroic cross-combiner assembly (prisms 420, 430, 440) having a top outer surface, a bottom outer surface, and a plurality of side outer surfaces (faces 420O, 430O, 440O, 420I) with one (face 420I) of the side outer surfaces facing the projection lens (see Fig. 10);

three micromirror display devices (micro-mirror-type optical modulation devices 200B, 200R, 200G), each including an array of digitally deflected mirrors positioned facing a corresponding one of the other side outer surfaces (faces 420O, 430O, 440O) of the dichroic cross-combiner assembly (see Fig. 10); and

a light source apparatus (light source 110) positioned such that the generated blue, green, and red light are provided to three side outer surfaces (faces 420O, 430O, 440O) facing display devices respectively, through the dichroic cross-combiner assembly, and the three micromirror display devices in turn reflecting the blue, green, and red light through the dichroic cross-combiner assembly again, toward the projection lens (see Fig. 10).

Nishida et al. do not teach explicitly the light source apparatus to be a coherent light source apparatus. However, Tiao et al. teach that advantages of employing a coherent light source apparatus include low power consumption, long lifetime and generation of low thermal energy (see Col. 1, lines 62-6). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to manufacture the light source apparatus of Nishida et al. such that it comprises the coherent light source apparatus discussed by Tiao et al. for improving overall system performance.

Nishida et al. further do not teach the light source apparatus to be positioned at a location lower than the projection lens, to generate blue, green, and red light. However, Kavanagh et al. teach folding a light path for obtaining

compactness of a projection system, the light source apparatus (lamp 1) being located at a location lower than a projection lens (lens 10) (see Col. 6, lines 50-1, Fig. 5B). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the projection system of Nishida et al. such that the light path is folded as taught by Kavanagh et al. for obtaining a more compact projection system.

With regard to claim 25, Nishida et al. teach the light source apparatus discussed above with respect to claim 24 to comprise a multicolor light source (see Fig. 10).

With regard to method claim 26, the structure of the projection system discussed above with respect to claims 24 and 25 renders the steps set forth in the method claims inherent to the operation of the projection system.

14. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishida et al. as applied to claim 26 above, and further in view of U.S. Patent No. 5,159,485 to Nelson.

With regard to claim 27, see discussion above with respect to claims 3 and 23.

Conclusion

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Nguyen whose telephone number is 703-305-2771. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Russ Adams can be reached on 703-308-2847. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4900.

mpn

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